



Innovations in Public Health Surveillance: The National Bioterrorism Syndromic Surveillance Demonstration Project

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Report Documentation Page

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Outline

- ◆ Electronic records for surveillance
- ◆ Syndromic surveillance for BT
- ◆ HPHC/MDPH System
- ◆ National Demonstration Project
- ◆ Issues and challenges
- ◆ Lessons

Electronic records for surveillance

- ◆ BT - timeliness is crucial
- ◆ EMR potentially “real time” with Dx
- ◆ Increasingly available
 - ◆ Large group practices, HMOs
- ◆ Low marginal cost
 - ◆ Already in a database somewhere
- ◆ “Value add” - eg BT surveillance

Syndromic Surveillance for BT

- ◆ First signs - non-specific prodrome
- ◆ ICD highly specific/granular
 - ◆ Clinician coding styles
 - ◆ Systematic coding influences
- ◆ Aggregate ICD into broad syndromes
- ◆ Currently 12 - eg “Respiratory Infection”
- ◆ HPHC proof of concept

https://btsurveillance.org/btpublic

techbargains.com - Cheapest computer de... Channing Labs/HPHC/HVMA Bioterrorism P... Zope on https://wchanning.bwh.harvard.edu/

 Bioterrorism Surveillance

Boston Bioterrorism Surveillance Daily Reports

Select from the list of pages below by clicking on the link of interest.
Please note that links marked "**(Private)**" require a valid UserID and Password.

[\(Private\) View the reports of daily syndrome episodes for greater Boston](#)
[Publication about detection of acute illness clusters \(Emerging Infectious Diseases\)](#)
[Publication about syndromic surveillance methods \(BioMed Central\)](#)
[Preprint - article in press at JUH on using minimally identifiable data for syndromic BT surveillance](#)

<http://btsurveillance.org>

Public web site with access to publications and information about the project

suggestions or enquiries may be directed to [Russ Lazard](#), Infectious Disease and Epidemiology related enquiries to [Rich Platt](#), statistical questions to [Ken Kleinman](#), questions about report programming and Epicare interface to [Inna Dashevsky](#)

If you have been assigned a userid and password for this site, you may click on the "View the reports" link above, then type these into the authentication dialogue box to identify yourself to gain access. Please use the link at the bottom of this page to contact the Webmaster if you have been assigned a UserID and password but are experiencing technical difficulties accessing the site. We regret that technical support may not be available outside normal business hours (Local time when you loaded this page was 2003/04/22 10:17:11.3124 GMT-4).

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last modified 25 Mar 2003

https://btsurveillance.org/btdaily/reports
techbargains.com - Cheapest computer de... Generated by btdaily.py for Channing Lab...

 Bioterrorism Surveillance

Boston Bioterrorism Surveillance Daily Reports

Massachusetts Department of Public Health
Daily Public Surveillance Report of Office Visits
With Diagnoses Corresponding to Infection Syndromes
Previous 30 Days Only. [Click here to see the entire period](#)

Click on a date (eg **Monday, 21 April, 2003**) to see a Summary report.

Click on an individual syndrome colored rate bar for a detailed syndrome report and map.

URI=Upper Respiratory Infection, LRI=Lower Respiratory Infection, UGI=Upper Gastrointestinal Infection, LGI=Lower Gastrointestinal Infection

<http://btsurveillance.org>

**Regular daily reports
since October 31 2001**

(Authorized users only)

[Tuesday, 01 April, 2003](#)



1.511

[Monday, 31 March, 2003](#)



1.597

[Sunday, 30 March, 2003](#)



0.448

[Saturday, 29 March, 2003](#)



0.510

[Friday, 28 March, 2003](#)



1.228

[Thursday, 27 March, 2003](#)



1.271

[Wednesday, 26 March, 2003](#)



1.400

[Tuesday, 25 March, 2003](#)



1.370

[Monday, 24 March, 2003](#)



1.941

[Sunday, 23 March, 2003](#)



0.485

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Back Forward Stop Refresh Home Search Favorites History Mail Print Edit

Address <https://btsurveillance.org:8445/btdaily/reports//liextr1115.html> Go Links

Bioterrorism Surveillance **Boston Bioterrorism Surveillance Daily Reports**

Wednesday, 14 November, 2001 <Prev [Up to Dates](#) Next> Friday, 16 November, 2001 [Back to Summary page](#)

Ir syndrome by census tract

http://btsurveillance.org

Next day daily results from Generalised Linear Mixed Models - P values for major syndromes

(Authorized users only)

| | | | | |
|------------|-----------|---|-----|---|
| Swampscott | 250092021 | 2 | 335 | 0 |
| Arlington | 250173563 | 2 | 498 | 0 |
| Wellesley | 250214044 | 2 | 650 | 0 |

* The 5 most extreme tracts are shown, plus all with counts not expected to occur more than once per month.

^ Estimated number of years between daily counts this extreme in

Wellesley, 4044, 2 cases

Quincy, 4171, 2 cases

| Syndrome | Visit ID# | Age | Sex | Temp | Diag at the visit | Diagnosis Description | Enc. Type | Patient ZIP code |
|---------------|-----------|-----|-----|-------|-------------------|-----------------------|-----------|------------------|
| URI/TEMP>=100 | 161 | 9 | F | 100.3 | 034.0 | STREP SORE THROAT | Visi | [REDACTED] |
| URI/TEMP>=100 | 162 | 39 | F | 100.1 | 034.0 | STREP SORE THROAT | URGE | [REDACTED] |
| DERM | 28 | 73 | F | . | 733.00 | OSTEOPOROSIS NOS | Visi | [REDACTED] |

<http://btsurveillance.org>

Detailed individual records on line for immediate access

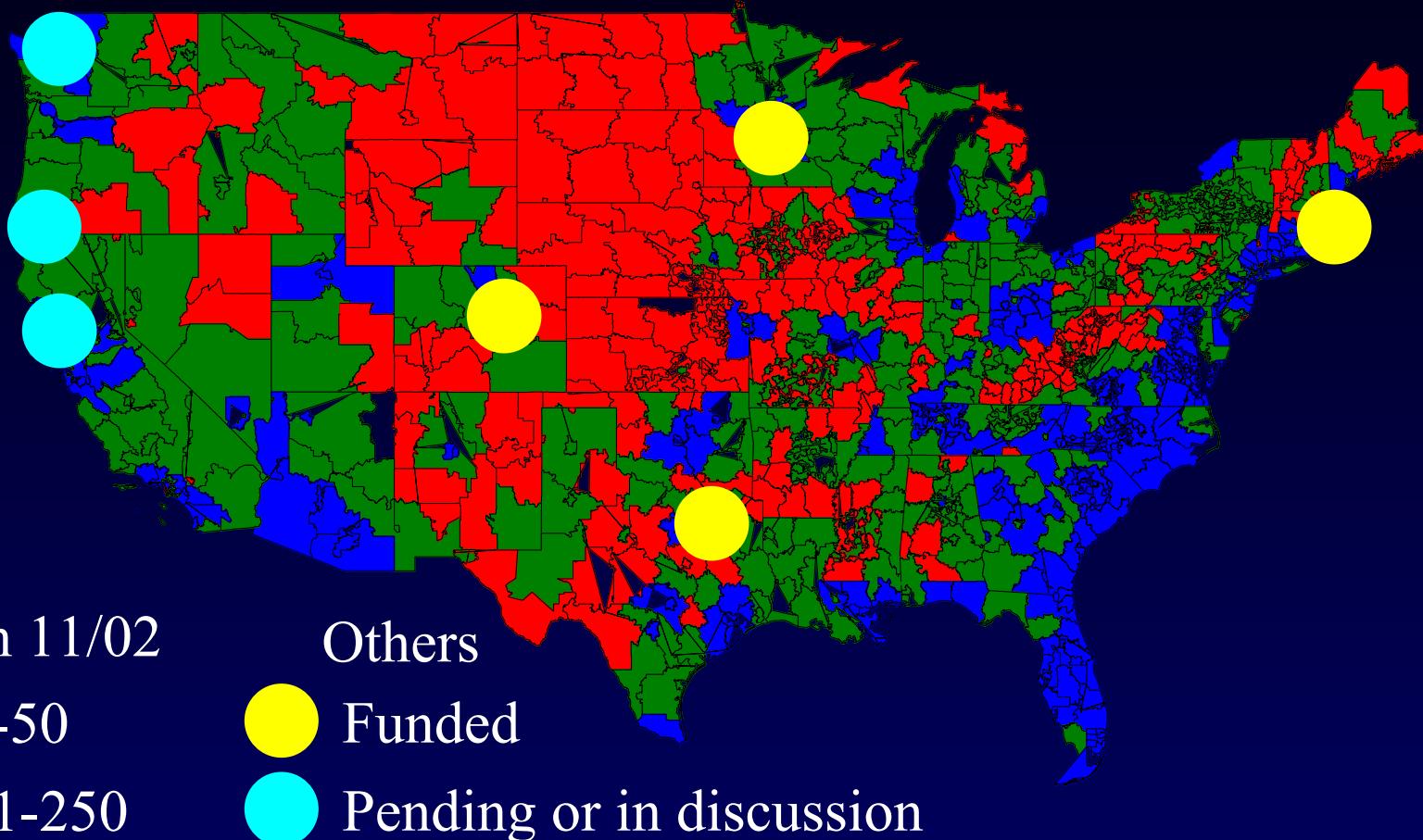
(Highly restricted authorized users only)

| | | | | | | | | |
|------|-----|----|---|---|--------|------------------------|------|------------|
| DERM | 123 | 71 | F | . | 287.5 | THROMBOCYTOPENIA NOS | Tele | [REDACTED] |
| DERM | 79 | 87 | F | . | 787.91 | DIARRHEA | Visi | [REDACTED] |
| DERM | 79 | 87 | F | . | 401.9 | HYPERTENSION NOS | Visi | [REDACTED] |
| DERM | 79 | 87 | F | . | 287.2 | PURPURA NOS | Visi | [REDACTED] |
| DERM | 79 | 87 | F | . | 569.42 | ANAL OR RECTAL PAIN | Visi | [REDACTED] |
| DERM | 79 | 87 | F | . | 715.90 | OA NOS-UNSPEC | Visi | [REDACTED] |
| DERM | 192 | 86 | F | . | 287.5 | THROMBOCYTOPENIA NOS | Tele | [REDACTED] |
| DERM | 49 | 31 | M | . | 782.7 | SPONTANEOUS ECCHYMOSIS | Visi | [REDACTED] |

National Demonstration Project

- ◆ Electronic health records
- ◆ Office visits, nurse telephone triage calls
- ◆ ~20 million people.
- ◆ 50 states.
- ◆ Distributed processing
- ◆ Centralized reporting
- ◆ Syndrome count data only
- ◆ HIPAA “deidentified” (statistician’s cert.)

National BT Demo Program



National Demonstration Project design features

- ◆ Scalable, data from many sources.
- ◆ Health plans put data extracts on a PC they control for processing.
- ◆ Analysis and reporting programs provided by data center.
- ◆ Internet-based communication.
- ◆ Encounter-level data stays with health plan or provider until health department requires it.
- ◆ Adaptable to other public health uses.

Surveillance strategy

- ◆ Extract encounters with an ICD9 code of interest.
- ◆ Initially daily. Potentially more frequently
- ◆ Group encounters into syndromes.
- ◆ Identify INITIAL visit for each episode of illness.
- ◆ Map episodes to the patient's home ZIP code initially
- ◆ Geocoding -> census tract when available
- ◆ Transfer summary data to data center
- ◆ Identify statistically “extreme” regions each period.
- ◆ Notify data provider and public health agency.

Tuesday, April 22, 2003

[Go to Today](#)

| | April 2003 | | | | | | |
|-----|------------|-----|-----|-----|-----|-----|--|
| Sun | Mon | Tue | Wed | Thu | Fri | Sat | |
| 30 | 31 | 1 | 2 | 3 | 4 | 5 | |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 | |

```
22/04/2003 10:45:46: natdemobtconsole.py started
22/04/2003 10:45:46: Read in 43295 zip codes
22/04/2003 10:45:46: http://www.time.gov contacted.
```

Identifiable data is all processed locally using software provided by the Datacenter

Identifiable lists of encounters available locally to be passed on in case of an event.

XML file, counts by zip by period only to Datacenter

| | | | | | | | | | | | | |
|----|----|-------|----------------------------------|---------|---|-------------------|-----|------|---|---|-----|--|
| 20 | 20 | Fever | 04/10/2003: New | 1 to 4 | M | Charlestown:02129 | VIS | None | U | 2 | BLK | |
| 21 | 21 | Fever | 04/10/2003: "New" | 1 to 4 | F | Randolph:02368 | VIS | None | U | 0 | BTR | |
| 22 | 22 | Fever | 04/10/2003: "New" | 1 to 4 | F | Cambridge:02138 | VIS | None | U | 1 | SOM | |
| 23 | 23 | Fever | 04/10/2003: "New" | 1 to 4 | F | Quincy:02169 | VIS | None | U | 2 | BTR | |
| 24 | 24 | Fever | 04/10/2003: "New" | 1 to 4 | M | Waltham:02451 | VIS | None | U | 1 | WEL | |
| 25 | 25 | Fever | 04/10/2003: (Last 09/April/2003) | 1 to 4 | F | Everett:02149 | VIS | None | U | 1 | SOM | |
| 26 | 26 | Fever | 04/10/2003: "New" | 1 to 4 | M | Somerville:02145 | VIS | None | U | 0 | SOM | |
| 27 | 27 | Fever | 04/10/2003: "New" | 5 to 12 | F | Wilmington:01887 | VIS | None | U | 1 | PBY | |
| 28 | 28 | Fever | 04/10/2003: "New" | 5 to 12 | F | Chelsea:02150 | VIS | None | U | 2 | SOM | |
| 29 | 29 | Fever | 04/10/2003: "New" | 5 to 12 | F | Saugus:01906 | VIS | None | U | 1 | SOM | |
| 30 | 30 | Fever | 04/10/2003: "New" | 5 to 12 | M | Dorchester:02125 | VIS | None | U | 1 | CH | |
| 31 | 31 | Fever | 04/10/2003: (Last 10/April/2003) | 5 to 12 | M | Milton:02186 | VIS | None | U | 0 | BTR | |
| 32 | 32 | Fever | 04/10/2003: "New" | 5 to 12 | F | Watertown:02472 | VIS | None | U | 0 | SOM | |
| 33 | 33 | Fever | 04/10/2003: (Last 02/March/2003) | 1 to 4 | F | Cambridge:02139 | VIS | None | U | 1 | SOM | |

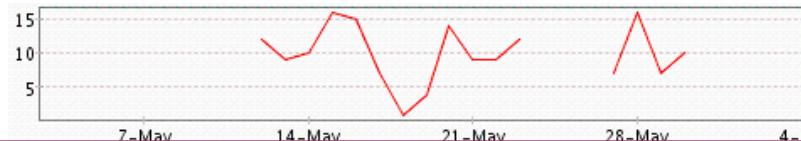
XML - counts to Data Center

```
<Period>
  <startTimeStamp>2003-04-10T01:00:00-05:00</startTimeStamp>
  <endTimeStamp>2003-04-11T00:59:59-05:00</endTimeStamp>
  - <geography TYPE="ZIP">
    <geovalue>01463</geovalue>
    - <syndrome TYPE="Respiratory">
    - <payer NAME="PR">
      <count>1</count>
      </payer>
    </syndrome>
  </geography>
  - <geography TYPE="ZIP">
    <geovalue>01527</geovalue>
    - <syndrome TYPE="Hemorrhagic">
    - <payer NAME="PR">
      <count>1</count>
      </payer>
    </syndrome>
  </geography>
  - <geography TYPE="ZIP">
    <geovalue>01581</geovalue>
    - <syndrome TYPE="Fever">
    - <payer NAME="PR">
      <count>1</count>
      </payer>
    </syndrome>
```



This is an experimental display
showing all counts from all data providers for the last 30 days
[Show Previous YEAR](#)

Botulism-like



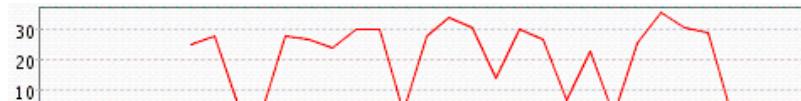
Data viewable as time series within minutes of arrival at datacenter

GLMM being run as historical data becomes available.

Lymphatic



Neurological



Outline

- ◆ Electronic records for surveillance
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- ◆ HPHC/MDPH System
- ◆ National Demonstration Project
- ◆ Issues and challenges
- ◆ Conclusions

Issues: non-technical

- ◆ Surveillance data model
 - ◆ Traditionally centralized identifiable
 - ◆ Alternative - only counts centralized
- ◆ HIPAA
- ◆ Privacy/Security
- ◆ Authentication & administration
- ◆ Data presentation, visualization
- ◆ User interface for ad-hoc queries
- ◆ Notification - who, how, when

Issues: technical

- ◆ Noisy data!
- ◆ “Optimal” models
- ◆ ICD9 granularity \Rightarrow Syndromes
- ◆ “Optimal” syndromes & ICD9 mapping
- ◆ Standards for data exchange - XML
- ◆ Authentication and access control
- ◆ Security for internet services - SSL

Overcoming challenges

- ◆ Shared definitions - CDC led workgroup
- ◆ Ad hoc queries.
- ◆ CDC PHIN/NEDSS compliance
- ◆ Open source infrastructure
- ◆ Open standards
- ◆ Open source code

Lessons

- ◆ EMR works for timely surveillance
- ◆ Distributed processing model works
- ◆ Design for additional data sources
- ◆ Standardized syndromes
- ◆ Standardized data exchange
- ◆ Strong encryption
- ◆ Best security practices



showing

Collaborators

at 30 days

Botulism-like

15
10
5

- ◆ Richard Platt
- ◆ Ken Klienman
- ◆ Inna Dashevsky
- ◆ Katherine Yih
- ◆ Courtney Adams
- ◆ Virginia Rego



Fever

25
20
15



Gastrointestinal

100
75
50
25



Hemorrhagic

20
15
10



10-May 12-May 14-May 16-May 18-May 20-May



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Fever

Gastrointestinal

Hemorrhagic

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Data flow

